

REMARKS

This is a response to the Office action that was issued on January 6, 2006 for the above-identified patent application. Prior to entry of this response, claims 1-19 and 20-71 were pending. In the Office action dated January 6, 2006, claims 1-27 and 35-64 were rejected under 35 U.S.C. § 102(b) as being anticipated by GB 2,283,235 to Collins (“Collins”) or in the alternative as obvious over Collins under 35 U.S.C. § 103(a). Further, claims 1-27 and 35-64 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,572,837 to Holland et al. (“Holland et al.”) or in the alternative as obvious over Holland et al. under 35 U.S.C. § 103(a). Applicant has studied the cited references in view of the pending claims, and Applicant respectfully traverses and requests reconsideration of the rejections expressed in the Office action.

Upon review of the Office action, Applicant submits that a fundamental distinction exists between the odorant recited in the claims and an inherent odor of the carbon-containing feedstock disclosed in the cited references. While Applicant respectfully traverses how the original claims are read upon the cited references, Applicant has made clarifying amendments to several of the original claims to more specifically recite that the feed stream includes a carbon-containing feedstock and a separate odorant that is added to the carbon-containing feedstock. By the above amendments, claims 1, 9, 23-24, 35, 49, and 59-60 are amended, claims 19 and 48 are cancelled without prejudice, and new claims 79-86 are added. Applicant submits that no new matter has been added by the above amendments. The above amendments also include clerical amendments to withdrawn dependent claims 23 and 59 to correct typographical errors that were not previously detected.

Rejection of Original Claims 1-17, 20-22, and 24-27

Amended claim 1 is reproduced below for the Examiner's convenience.

Amended claim recites:

A fuel processing system, comprising:

a fuel processor adapted to produce a product hydrogen stream containing hydrogen gas from a feed stream containing a carbon-containing feedstock, water and an odorant, wherein the odorant has a different composition than the carbon-containing feedstock, imparts to the feed stream an odor distinct from the carbon-containing feedstock, and is at least substantially free from sulfur compounds;

at least one reforming catalyst bed within the fuel processor and adapted to produce a mixed gas stream containing hydrogen gas and other gases from the feed stream; and

a separation region within the fuel processor and adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream containing at least substantially hydrogen gas and a byproduct stream containing at least a substantial portion of the other gases, and further wherein the product hydrogen stream is formed from the hydrogen-rich stream.

Claim 1 was amended to clarify certain features. For example, the claim now clarifies that the odorant has a different composition than the carbon-containing feedstock, as discussed on pages 5-8 of the specification. The odorant was further clarified by specifying that it imparts an odor distinct from the carbon-containing feedstock, as described specifically on pages 6 and 7 of the specification. In addition, the claim now recites that the odorant is substantially free from sulfur compounds, as discussed on page 6 of the specification.

Collins describes a fuel processing system having a combined autothermal reformer and hydrogen separator. A reforming catalyst and a combustion catalyst are provided in the autothermal reformer. The Collins fuel processing system uses a hydrocarbon supply of methanol or diesel fuel.

Holland et al. relates to a method and apparatus for processing a hydrocarbon fuel into a hydrogen-rich stream. The apparatus of Holland et al. includes primary and secondary fuel processing reactors and first and second hydrogen separators. For hydrocarbon fuels, Holland et al. discloses gasoline, ethane, butane, light distillates, dimethyl ether methanol, ethanol, propane, naphtha, kerosene, synthesis gas, or reformate from a high temperature reformer.

1. An odorant is not an inherent feature of a carbon-containing feedstock.

As reproduced in full above, amended claim 1 recites in part a fuel processing system comprising a feed stream containing a carbon-containing feedstock, water, and an odorant. Thus, the feed stream contains three distinct elements, one of which is a carbon-containing feedstock, and another of which is an odorant. Because amended claim 1 recites separate carbon-containing feedstock and odorant components, the carbon-containing feedstock and the odorant are properly interpreted as different compositions. As discussed in more detail herein, Applicant has amended claim 1 to further clarify this feature.

Applicant submits that the rejections that are predicated upon an odorant being inherent in the fuels disclosed in the cited prior art is not only improper, but also inconsistent with the recited claim language. As discussed above, amended claim 1 recites separate carbon-containing feedstock and odorant elements. Undoubtedly, certain fuels recited in Collins and Holland et al. have an inherent smell deriving from vapor of the fuel itself. Similarly, some odorants may include carbon and/or may be consumed in a hydrogen-producing reforming reaction. However, amended claim 1 recites a feed stream that includes an odorant in addition to a carbon-containing feedstock. Applicant

submits that vapors emanating from the carbon-containing feedstock of Collins or Holland et al. are not properly construed to be the odorant recited in amended (or original) claim 1. Specifically, these odors reflect the carbon-containing feedstock itself in vapor form and are not a separate component of the feed stream, much less the recited odorant that has a different composition and imparts a characteristic odor that is distinct from any odor of the carbon-containing feedstock. Accordingly, Applicant submits that the odorant recited in claim 1 is not inherent in the cited references merely because the references disclose carbon-containing feedstocks that may have a detectable odor. Moreover, even if such a construction was upheld, amended claim 1 recites that the odorant has a different composition and odor than the carbon-containing feedstock component of the feed stream.

Applicant agrees with the Examiner that neither Collins nor Holland et al. disclose or suggest an odorant contained within the feed stream. Indeed, neither reference describes adding an odorant to a feed stream. Accordingly, it follows that neither reference discloses or contains any suggestion of what types of odorants may be used. Because the cited references do not disclose or suggest a feed stream containing a carbon-containing feedstock, water, and an odorant, Applicant suggests that they do not anticipate claim 1 or render the subject matter of amended claim 1 obvious.

Applicant respectfully traverses the Examiner's assertion that feed streams containing a carbon-containing feedstock, water, and an odorant are well known in fuel processing systems as recited in claim 1. To the contrary, Applicant believes that the present application is the first to teach the recited hydrogen-producing fuel processing system. Moreover, no reference disclosing such a feed stream has been cited.

Accordingly, Applicant asserts that the burden has not been met to establish that the claim 1 fuel processing system is well known. Similarly, Applicant submits that a *prima facie* case of obviousness has not been established. As discussed above, Applicant submits that this is primarily due to the fact that neither of the cited references contains any disclosure or suggestion to include an odorant as an additive to a feed stream for a hydrogen-producing fuel processing system.

2. The cited references do not disclose an odorant having a composition distinct from a carbon-containing feedstock.

As reproduced in full above, amended claim 1 recites in part a fuel processing system comprising an odorant having a different composition than the carbon-containing feedstock. Positively reciting this feature clarifies that the odorant is distinct from the carbon-containing feedstock and water. Thus, the odorant can not be inherent in a carbon-containing feedstock because it is a distinct composition.

An odorant with a composition distinct from the carbon-containing feedstock is clearly not shown in Collins or Holland et al. as they disclose, at most, fuels having an inherent smell. Indeed, the Examiner correctly states that neither reference teaches an odorant contained within the feed streams. Because an odorant is not merely a fuel having an inherent smell, such as some of the fuels in Collins or Holland et al., the cited references fail to disclose an odorant as recited in amended claim 1.

Because the references do not disclose or suggest an odorant with a composition distinct from a carbon-containing feedstock, the references fail to disclose each feature of amended claim 1. Further, it would not be *prima facie* obvious under 35 U.S.C. § 103(a) to derive this feature of the fuel processing system because there is no evidence that one skilled in the art would modify either of the references to yield the fuel processing system

recited in amended claim 1. Accordingly, Applicant submits that claim 1 patentably distinguishes the cited references, and Applicant requests that the rejections of claim 1 be reconsidered and withdrawn.

3. Neither Collins nor Holland et al. discloses an odorant that imparts an odor distinct from the carbon-containing feedstock.

As reproduced in full above, amended claim 1 recites in part a fuel processing system comprising an odorant that imparts an odor distinct from the carbon-containing feedstock. This amendment clarifies that the odorant and carbon-containing feedstock have different odors instead of merely a carbon-containing feedstock that has an inherent odor. Of course, certain carbon-containing feedstocks may be odorless, such as methanol. In the case of an odorless carbon-containing feedstock, the odor imparted by the odorant will necessarily be distinct from the lack of odor in the odorless carbon-containing feedstock.

Although Applicant does not agree with the Examiner's contention that the claim 1 odorant is inherent in the cited references, the amended language obviates the issue. Even assuming *arguendo* that the previously recited odorant was inherent in the references, the references do not disclose an odorant imparting an odor distinct from the carbon-containing feedstock. A given fuel vapor may have an inherent smell, but amended claim 1 recites imparting an odor distinct from the odor, if any, of the carbon-containing feedstock. Thus, the cited references do not disclose or suggest each feature of amended claim 1.

The cited references do not anticipate amended claim 1 under 35 U.S.C. § 102(b) because they do not disclose an odorant imparting an odor distinct from the carbon-containing feedstock. Further, the Office action contains no grounds to support the

notion that one skilled in the art would come up with this feature, which is necessary to establish a *prima facie* case that amended claim 1 is obvious under 35 U.S.C. § 103(a). Accordingly, pending claims 1 and claims 2-17, 20-22, and 24-27 depending from claim 1 are submitted for allowance.

4. The cited references do not disclose an odorant substantially free from sulfur compounds.

As reproduced in full above, amended claim 1 recites in part a fuel processing system comprising an odorant that is at least substantially free from sulfur compounds. In contrast, the cited references do not disclose any odorant, much less odorants that are at least substantially free from sulfur compounds. In fact, Holland et al. specifically discusses removing sulfur from fuels to avoid poisoning system catalysts, which implies that sulfur compounds are present, if at least initially, in the Holland et al. methods and apparatuses. Similarly, Collins discloses specific examples of sulfur-containing fuels, with these examples being cited in the Office action as providing the claimed odorant.

Because the references fail to disclose an odorant that is at least substantially free from sulfur compounds, the references do not anticipate amended claim 1. The references do not render claim 1 *prima facie* obvious because there is no evidence to support that one skilled in the art would come up with the substantially sulfur-free odorant feature.

5. Conclusion.

Because the cited references fail to disclose or suggest the fuel processing system of amended claim 1 with the recited odorant features, they fail to anticipate the claim under 35 U.S.C. § 102(b). Moreover, there is no evidence that one skilled in the art

would be motivated to modify either of the references to develop the fuel processing system of claim 1; thus, the system is not *prima facie* obvious under 35 U.S.C. § 103(a). Accordingly, Applicant requests that the rejection of claim 1 be reconsidered and withdrawn. Applicant submits that amended claim 1, as clarified, recites several patentably distinguishing elements from the cited references, with any one of the recited elements being sufficient to compel withdrawal of the rejections expressed in the Office action. The fact that there are several distinguishing elements only reinforces the patentability of amended claim 1 over the disclosures of the cited references.

Claims 2-18 and 20-34 depend from amended claim 1 and therefore should be allowed when amended claim 1 is allowed. For the purpose of brevity, each of these dependent claims and each additional reason why these claims patentably distinguish the cited references are not discussed in this response. However, Applicant wants to briefly discuss a few of the dependent claims to identify a few additional elements that are neither disclosed nor suggested by the cited references.

For example, claim 14 recites that the odorant includes at least one organic amine having at least one amine functional group. In contrast, none of the cited references disclose any form of organic amine. Similarly, the Office action is silent as to how this subject matter is believed to be anticipated or rendered obvious by the cited references. Accordingly, Applicant requests withdrawal of the rejections of claim 14 for at least this additional reason. Claims 15-17 depend from claim 14 or recite at least the subject matter of claim 14 and therefore should be allowed when claim 14 is allowed.

Claim 21 recites that the carbon-containing feedstock includes methanol. Since methanol does not have a detectable odor, Applicant submits that the rejections of

claim 21 based on the cited references inherently disclosing a carbon-containing feedstock with an odorant should be withdrawn for the additional reason that this is not true when the carbon-containing feedstock is methanol.

Rejection of Claims 35-47, 49-58, and 60-64

Amended claim 35 is reproduced below for the Examiner's convenience and recites:

35. In a fuel processing system containing a fuel processor adapted to produce a product hydrogen stream comprising hydrogen gas from a feed stream comprising a carbon-containing feedstock that is a liquid at 25 degrees Celsius and 1 atmosphere pressure, the improvement comprising: the feed stream further comprising an odorant comprising an organic amine having at least one amine functional group and a strong and detectable odor distinct from the carbon-containing feedstock.

Claim 35 was amended to clarify that the carbon-containing feedstock exists in a liquid state at standard temperature and pressure. Liquid carbon-containing feedstocks are discussed throughout the specification, such as on pages 2, 5, and 8 of the specification. Claim 35 was further amended to clarify that the odorant comprises an organic amine having at least one amine functional group, as discussed on pages 7 and 8 of the specification. Applicant submits that no new matter was added by the amendments to claim 35.

In contrast to the subject matter recited in amended claim 35, neither Collins nor Holland et al. discloses an odorant, much less the odorant recited in amended claim 35. As discussed above, Collins and Holland et al. merely disclose carbon-containing fuels, some of which may have inherent odors. Thus, the cited references fail to disclose an odorant having a detectable odor that is distinct from the carbon-containing feedstock.

Further, the cited references do not disclose or suggest an odorant (or carbon-containing feedstock) comprised of an organic amine having at least one amine functional group.

Because Collins and Holland et al. fail to disclose multiple features recited in amended claim 35, the references fail to anticipate the claim under 35 U.S.C. § 102(b). Moreover, because evidence is lacking that one skilled in the art would be motivated to modify either of the references to come up with the claim 35 fuel processing system, a *prima facie* case that the claim is obvious under 35 U.S.C. § 103(a) has not been established.

For at least the above reasons, Applicant respectfully requests reconsideration and withdrawal of the rejections of claim 35. Claims 36-47, 49-64, and 79-80 depend from amended claim 35 and therefore should be allowed when claim 35 is allowed. Claims 49-51 should also be allowable for reasons similar to those expressed with respect to claims 15-17. New claim 79 recites that the carbon-containing feedstock includes at least one alcohol, and new claim 80 recites that the carbon-containing feedstock includes methanol. Claim 80 should also be allowable for the additional reasons expressed above with respect to claim 21.

New Claims 81-86

The above amendments add new independent claim 81, which is reproduced below for the Examiner's convenience. Applicant submits that claim 81 is fully supported by the original specification, and is within the scope of the prior searches performed by the Examiner. Claim 81 recites:

81. A fuel processing system, comprising:

a feed stream comprising:

 water,

 a carbon-containing feedstock comprising a hydrocarbon or an alcohol, the carbon-containing feedstock being colorless and liquid at 25 degrees Celsius and 1 atmosphere pressure; and

 an organic amine additive having at least one amine functional group and a boiling point less than approximately 300 degrees Celsius for imparting a characteristic odor distinct from the carbon-containing feedstock;

 a fuel processor adapted to produce a product hydrogen stream containing hydrogen gas from the feed stream;

 at least one reforming catalyst bed within the fuel processor adapted to produce a mixed gas stream containing hydrogen gas and other gases from the feed stream; and

 a separation region within the fuel processor and adapted to receive the mixed gas stream and to separate the mixed gas stream into a hydrogen-rich stream containing at least substantially hydrogen gas and a byproduct stream containing at least a substantial portion of the other gases, and further wherein the product hydrogen stream is formed from the hydrogen-rich stream.

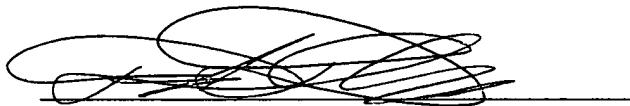
Claim 81 recites numerous features deriving support from the original specification. The recited feed stream is discussed on pages 3-8 of the specification and includes water, a carbon-containing feedstock, and an organic amine additive. Discussion directed to the recited fuel processor and separation region may be found on at least pages 8-11 of the specification. Applicant submits that claim 81 patentably distinguishes the cited references for at least the above-discussed reasons relating to the failure of the references to disclose or suggest a hydrogen-producing fuel processing system with a feed stream that contains a carbon-containing feedstock and a distinct odorant additive, in addition to the more specific reasons expressed with respect to amine odorants and odorless carbon-containing feedstocks.

Claims 82-86 recite additional subject matter relating to the fuel processing system of claim 81. Support for claims 82-86 can be found throughout the specification and in particular on pages 6-8.

With the entry of the above amendments, and for the reasons discussed herein, Applicant submits that all of the issues raised in the Office action have been addressed and overcome. If there are any remaining issues, or if the Examiner has any questions, Applicant's undersigned attorney may be reached at the number listed below. Similarly, if the Examiner believes that a telephone interview may be productive in advancing prosecution of the present application, the Examiner is invited to contact Applicant's undersigned attorney at the number listed below.

Respectfully submitted,

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